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AN EVALUATION OF STREAM TROUT STOCKING IN LANGLADE, LINCOLN AND MARATHON COUNTIES

By Max Johnson, Antigo

ABSTRACT

Thirteen streams in Langlade, Lincoln and Marathon counties were surveyed during a 6-year study to determine the survival of stocked hatchery fish. Single-run electrofishing surveys revealed an average survival rate of 1.7% for yearling brook trout and 11.3% for yearling brown trout after 60 to 120 days in the stream.

A stratified creel census on two streams showed an angler harvest of 43% to 68% for stocked brook trout and 35% to 64% for stocked brown trout. More than 75% of the harvest occurred in the first month of the trout fishing season, and a major portion of the harvest occurred opening weekend. About 32% to 40% of the stocked brook trout and 27% to 60% of the stocked brown trout were not recovered by stream shocking, presumably because of natural mortality.

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INTRODUCTION

From 1971-76, a study of stream trout stocking was conducted in the Antigo area to evaluate this program's success in augmenting existing trout populations. The streams selected for the study are representative of most stocked trout streams in the northern third of the state. Thus, the findings have general management applications for this region.

Electrofishing gear was used to determine the number of days stocked fish remained in the fishery. A creel census was also conducted on two streams to determine the extent and nature of the angler harvest.

DESCRIPTION OF STUDY AREA

Thirteen streams in Langlade, Lincoln and Marathon counties in north central Wisconsin were studied. These streams exhibited a wide variety of habitat types and water conditions (Table 1); therefore, some were Class I trout water while others were Class II.

TABLE 1. Characteristics of 13 streams studied.

Survey Date	Stream	Trout Stream Class*	Ave. Width (feet)	Survey Length (miles)	Est. Flow (cfs)	Alkalinity (ppm)
6/14/71 - 7/18/71	Eau Claire River, East Branch	II	47.0	17.0	20-25	135
7/1/71 - 7/20/71	Eau Claire River, West Branch	II	35.0	24.4	10-28	85
6/7/72 - 6/21/72	Lilly River, East Branch	II	24.5	6.6	7	126
6/21/72 - 6/27/72	Lilly River	II	51.7	6.4	20-30	128
6/19/73 - 7/17/73	Fourmile Creek	II	15.0	7.7	4	30
8/2/73 - 8/29/73	Hunting River	II	45.0	15.6	18-25	85
6/24/74 - 7/11/74	Ninemile Creek	II	15.0	10.4	6	93
7/31/74 - 8/6/74	Spirit River	II	33.0	2.4	10	40
Summer 1974 and 1975	Plover River	I, II	55.0	27.0	10-40	169
7/24/75 - 9/3/75	Big Pine Creek	II**	16.0	12.3	5	144
8/15/75 - 8/26/75	Meadow Creek	II	9.0	10.6	5	114
9/15/75 - 9/24/75	Comet Creek	II**	14.0	7.7	10-15	142
6/1/76 - 9/22/76	Prairie River	I, II	64.0	29.8	15-40	77

*Class I - Good water conditions, high natural reproduction and suitable density of wild trout which under current management programs could be expected to continue to produce wild trout. No stocking is carried out on these waters. Class II - Streams which have good water conditions and may have some natural reproduction but, where natural reproduction is not sufficient to assure satisfactory fishing, stocking may be necessary. Class III - Streams which have marginal water conditions for sustaining trout populations on a year-round basis.

**Classification changed to Class I after survey.

METHODS

Fish Marking and Stocking

All fish to be stocked were marked by removal of a fin and held at the hatchery at least one day prior to stocking. An adipose clip was used unless the possibility of interchange existed, then pectoral and ventral clips were used.

Carryover (yearling) fish were stocked in late April or early May and the fall fingerlings in late September or October. All stocking was done in Class II trout streams as classified in "Wisconsin Trout Streams", DNR Pub. No. 6-3600(74) (Table I). Fish were usually stocked at public roads crossing the stream. An effort was made to evenly distribute the fish, but they were not scattered between access points.

Sampling

The streams were sampled with a DC shocker boat in the summers (June - September) of 1971-76, with most of the surveys in June and July. A three- or four-man crew sampled the entire length of the streams where possible. Certain stream portions could not be surveyed due to inaccessibility or beaver flowages, and in some areas streams were not wadeable. But in all cases, a high percentage of the stream length was electrofished.

In addition, stream sections below classified trout waters were sampled if downstream movement of trout was anticipated. On all tributaries large enough to accommodate the stream shocker boat, one station was also surveyed.

Creel Census

In 1974, the Plover River and the East Branch of the Eau Claire River were selected for a creel census. The objective was to determine the extent and duration of the angler harvest of stocked fish.

The creel census was stratified by time and day. Each day of the week was sampled once each month, and each day was divided into three sampling periods: early, 6 a.m. - 2 p.m.; midday, 10 a.m. - 6 p.m.; and late, 2 p.m. - 10 p.m. Opening weekend was sampled separately, because unusually high fishing pressure occurs at that time.

Creel census days and sampling periods were selected at random. The census began on 4 May 1974, continued through 1 July 1974, began again on 31 August 1974, and continued to the end of the trout season on 30 September 1974. The census data are expanded to cover July and August using data from the last two weeks in June and September as a base. Fishing activity during July and August was relatively light and observations indicated that the data obtained during late June and September were representative of this period.

In the creel census, the 8-hour sampling period was divided into 2-hour segments during which car counts and fisherman interviews were made. Car counts and the average number of fishermen per car were used to determine fishing pressure. A complete car count was considered the instantaneous count. Usually, car counts were made at the beginning of the 2-hour period and covered the entire stream length.

Because of the complexity of the creel census, a separate and more detailed report on census results is being prepared and will be published in the future.

RESULTS AND DISCUSSION

Stocked Trout Survival

The survey indicated that only a small percentage of the stocked trout remained in the 13 study streams 2 to 4 months after release (Table 2). Recovery of spring-stocked yearling brook trout ranged from none to 5.0%. Three streams were also stocked with fingerling brook trout in the fall preceding a survey. In two of these streams, no carryover of fingerlings was found. In the remaining stream, just 3 of the 3,000 stocked brook trout fingerlings were recovered. Other studies evaluating fingerling stocking in northern Wisconsin produced similar results (R. Wendt, DNR, pers. comm.; T. Thuemler, DNR, pers. comm.).

Survival of yearling brown trout was considerably higher than that of yearling brook trout, ranging from 3.3% to 39.0%. Fingerling brown trout stocked in the fall did not fair much better than brook trout. Recovery from three streams ranged from none to 1.2%.

In addition, yearling brown trout were stocked in the spring a year prior to the survey in the Spirit and Plover rivers. Not 1 of the 1,500 trout stocked on the Spirit River could be found. On the Prairie River, only 76 of 3,300 stocked brown trout (2.3%) carried over through the first 14 months.

Yearling rainbow trout were stocked in two of the study streams. Recovery of stocked rainbows was low, averaging 1.9%.

When considering all streams surveyed, the highest rate of recovery was for yearling brown trout (11.3%) and the lowest recovery was of fall fingerling brook trout (0.03%) (Table 3). Recovery rates for stocked yearling brook and rainbow trout were similar.

TABLE 2. Stocking and electrofishing survey data for streams studied.

Stream	No. of Trout Stocked*			Date Stocked	Date Surveyed	Recovery of Stocked Trout**					
	Brook	Brown	Rainbow			Brook		Brown		Rainbow	
						No.	Percent	No.	Percent	No.	Percent
Eau Claire River, East Branch	2,500	1,000		Apr 1971	Jun, Jul 1971	29	1.2	45	4.5		
Lily River	1,000	1,000		May 1972 (early)	Jun 1972	22	2.2	134	13.4		
Lily River, East Branch	500			May 1972 (early)	Jun 1972	25	5.0				
Eau Claire River, West Branch	1,500	500		May 1972 (early)	Jul 1972	39	2.6	81	16.2		
Hunting River	1,500 ^a	2,000 ^a		Sep 1972	Jul, Aug 1973						
	2,000	1,000		May 1973	Jul, Aug 1973	22	1.1	40	4.0		
Fourmile Creek		500		May 1973	Jun 1973			21	4.2		
Meadow Creek	300	500		May 1973	Aug 1975			104	20.8		
Spirit River		1,500 ^b		Apr 1973	Jul 1974						
		1,500 ^a		Sep 1973	Jul 1974			2	0.1		
		1,500		May 1974	Jul 1974			104	6.9		
Ninemile Creek	300	300		May 1974	Jun, Jul 1974	6	2.0	117	39.0		
Plover River	1,000 ^a	2,000 ^a		Sep 1974	Jun, Jul 1975			25	1.2		
	2,000	5,000	1,000	May 1975	Jun, Jul 1975	27	1.3	186	3.7	22	2.2
Big Pine Creek		1,000		May 1975	Jul, Sep 1975			79	7.9		
Comet Creek	500			May 1975	Sep 1975						
Prairie River	3,000 ^a			Oct 1975	Jun-Aug 1976	3	0.1				
		3,000 ^b		Jun 1975	Jun-Aug 1976			76	2.3		
	2,000	5,300	2,000	Apr 1976	Jun-Aug 1976	30	1.5	178	3.3	33	1.6
TOTAL	18,100	27,900	3,000			203	$\bar{x}=1.3^C$	1,192	$\bar{x}=8.0^C$	55	$\bar{x}=1.9$

*All are yearling trout except where noted.

**Actual number recovered, not estimates.

^aFall fingerlings.

^bYearlings stocked in the spring a year prior to survey.

^cThe average includes both yearlings and fall fingerlings. The average recovery rates for stocked yearlings are 1.7% and 11.3% for brook trout and brown trout, respectively (60-120 days after stocking).

TABLE 3. Summary of average recovery rates for stocked trout.

Trout Species	No. of Streams Stocked	Percent Recovery
Brook Trout		
Yearling	10	1.5
Fall Fingerling	3	0.03
Brown Trout		
Yearling	11	11.3
Fall Fingerling	3	0.4
Rainbow Trout		
Yearling	2	1.9

Overall sampling efficiency ranged from 40% to 50%; however, sampling efficiency on larger hatchery fish was considerably higher, especially on brown trout in smaller streams. In these streams, efficiency on the larger trout approached 80%. Most of the streams with higher recovery rates (Meadow Creek, East Branch Lily River and Ninemile Creek) were smaller, shallow streams with few deep pools.

It is interesting to note the similarities in the survival of stocked trout for the two largest streams surveyed -- the Plover River and the Prairie River. In both instances, the electrofishing survey covered almost 30 miles of stream, and similar numbers of trout had been stocked in each. Recovery rates for the Plover River were 1.3% of the stocked brook trout and 3.7% of the brown trout, while for the Prairie River the recovery rates were 1.5% for brook trout and 3.3% for brown trout (Table 3).

Because of the low recovery rates, despite fairly high sampling efficiency, a creel census was incorporated into this evaluation to determine what happened to the 80% to 90% of the stocked fish not captured during electrofishing surveys 60 to 120 days after stocking. Movement of stocked trout out of the study area, either downstream or into tributaries, was not a significant factor in the low recovery rates.

Creel Census Results

Stream shocking and creel census data for stocked trout in the East Branch of the Eau Claire River and the Plover River indicated that a large majority of all harvested trout were native trout. Only 20% of the 10,990 trout harvested from the Plover River were stocked brook and brown trout, while just 30% of the 8,855 trout harvested from the East Branch of the Eau Claire River were hatchery fish. In addition, about 5% of the trout harvested from the Plover River were hatchery rainbow trout.

Forty-three percent of the yearling brook trout stocked in the Plover River were harvested by fishermen (Table 4). In the East Branch of the Eau Claire River, 68% of the hatchery yearling brook trout were harvested by fishermen. In the case of stocked yearling brown trout, 35% and 64% were harvested from the Plover River and the East Branch of the Eau Claire River, respectively.

A high percentage of the season's harvest of stocked trout occurred opening weekend of the fishing season. And by the end of May, after approximately one month of fishing, nearly all hatchery fish that were going to be caught had been harvested. Although the trout bag limit on these two rivers was five fish through May and ten thereafter, the lower bag limit in the first month of the season did not appear to extend the harvest of stocked trout.

Stream shocking data showed that only 2.2% to 9.0% of the stocked yearling brook and brown trout remained in the Plover River and the East Branch of the Eau Claire River at the end of the season (Table 5). This means there was a natural mortality rate of 30% to 60% for stocked trout in these streams.

The natural mortality rate may have been even greater in the other study streams. The Plover River and the East Branch of the Eau Claire River were two of the largest streams in this study and received the heaviest fishing pressure of all streams surveyed, excluding the Prairie River. Consequently, the harvest from these streams was probably greater than from all other study streams, resulting in lower natural mortality rates for stocked trout.

TABLE 4. Estimated angler harvest of stocked trout in the East Branch of the Eau Claire River and Plover River, Wisconsin (1974).

Stream	Stocked Trout Harvested Opening Weekend		Early Season Harvest of Stocked Trout				Stocked Trout Harvested During Season		Stocked Trout Harvested (percent)	
	Brook	Brown	May		June		Brook	Brown	Brook	Brown
			Brook	Brown	Brook	Brown				
Eau Claire River, East Branch	1,109	*	1,479	627	537	13	2,054	640	68	64
Plover River	*	471	354	1,548	64	136	431	1,739	43	35

*Not stocked at that time.

TABLE 5. Summary of stocked trout survival in the East Branch of the Eau Claire River and the Plover River, Wisconsin (1974).

	Stocked Trout Harvested (percent)	Stocked Trout Remaining in Stream* (percent)	Stocked Trout Natural Mortality (percent)
<u>Eau Claire River, East Branch</u>			
Brook Trout	68	2.2	29.8
Brown Trout	64	9.0	27.0
<u>Plover River</u>			
Brook Trout	43	2.6	54.4
Brown Trout	35	7.4	57.6

*Percentage doubled to compensate for sampling efficiency of about 50%.

This study indicated that brook trout provided a better return to fishermen than brown trout because of their higher average harvest rate. In the fiscal year 1973-74, rearing and distribution of brook trout cost an average of \$2.45/lb (J. Klingblel, DNR, pers. comm.). Therefore, an average return harvest of 60%, as found on the East Branch of the Eau Claire River and the Plover River, would enable a resident fisherman who catches five stocked brook trout to recoup the price of his fishing license. Brown trout cost an average of \$1.24/lb in fiscal year 1973-74. At this rate, with an average return harvest of 48% as found on the East Branch of the Eau Claire and Plover rivers, a resident fisherman who catches seven stocked brown trout has recouped the price of his season fishing license.

MANAGEMENT IMPLICATIONS AND SUMMARY

It is apparent from this study that stocking of yearling or legal trout in northern Wisconsin streams essentially provided a 1-month fishery. A high percentage of brook trout were caught by fishermen early in the season and survival of the remaining fish was minimal. Fewer brown trout were caught, thus more survived over a longer period. (Some brown trout, probably less than 3%, survived long enough to grow to 12-15 inches in length.)

A fisherman who caught five stocked brook trout or seven stocked brown trout from the streams studied got more for his money in terms of product than he paid for his entire season's fishing license. Therefore, all other fishermen are paying the bill for those who catch even as few as five or seven stocked trout. Although the brown trout provided a lower average return harvest than brook trout, those that survived provided a larger fish to anglers later in the season due to growth.

Thus, according to this study, current methods of stream stocking are not attaining the intended goal of a summer-long fishery with significant carryover to the following season. Also, stocking of fall fingerling trout in streams should be discontinued unless proven successful through future research. The impact of reduced quotas and scatter planting deserves attention and consideration should be given to multiple stockings, followed by studies to evaluate survival and harvest. Further study is also needed to confirm the effects of stocking on native trout. Stocking may have increased mortality of native trout and caused artificially high fishing pressure on the streams in this study (see Vincent 1975).

A statewide evaluation of the stream trout stocking program is needed. Is the 1-month sport fishery desirable, and should it be continued? Individual fish managers cannot make this decision independently. It must be made on a statewide or at least a regional basis.

LITERATURE CITED

- Vincent, E.R.
1975. Effect of stocking catchable trout on wild populations. p. 88-91 in Proc. Wild Trout Manage. Symp. at Yellowstone Nat. Park. Trout Unlimited and U.S. Dep. Inter.

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